

Remarks/Arguments

Claims 1, 2 and 4 – 17 are currently pending in this application. All the pending claims are currently rejected.

In Applicants previous response Applicants submitted a Declaration Under 37 CFR 1.132 of Michael Y. Young. In Section 2 of the Office Action the Examiner objected to the oath citing MPEP §§ 602.01 and 602.02, because the declaration “does not state that the person making the oath or declaration has reviewed and understands the contents of the specification, including the claims, as amended by any amendment specifically referred to in the oath or declaration”. Section 602 of the MPEP is directed to the “original oath or declaration”. Subsections 602.01 and 602.02 are subsets of Section 602 and also only refer to applicants original oath of the inventors and do not apply to declarations, such as this one, submitted under 37 CFR § 1.132. However, to avoid the issue we have prepared a Supplemental Declaration for Mr. Young’s signature, but unfortunately Mr. Young was unavailable to sign the declaration when this response was being submitted. We will provide Mr. Young’s Supplemental Declaration under 37 CFR § 1.132 as soon as he returns to the office. Mr. Young’s Supplemental Declaration will specifically state that he has reviewed and understands the contents of the specification, including the claims, as amended by this response.

The Examiner further objected to Mr. Young’s Declaration as not providing any factual evidence and merely expressing Mr. Young’s opinion. The original Declaration of Mr. Young set forth Mr. Young’s credentials, which are certainly factual and demonstrate that Mr. Young has many years of experience and can qualify as a technical expert in this area. From his review of the Shallenberger reference and his familiarity with the design Mr. Young concluded that the Shallenberger reference neither teaches a flared output or a double chamfered inlet. This is not just the opinion of an engineer, but the conclusion of an expert. Mr. Young has further stated that the double chamfered inlet and flared outlet achieved a pressure drop reduction near that of a rounded inlet and venturi outlet while meeting the numerous constraints imposed by the performance requirements of the nuclear fuel assembly, which is a fact, not just an opinion. Mr. Young concluded his Declaration by stating the Westinghouse findings that the double chamfered inlet has been found not to adversely impact the benefit of the venturi profile in the bottom nozzle coolant flow holes and provides a significant manufacturing savings over the

normal venturi gradient profile between the inlet and outlet of the venture flow holes. Mr. Young's Supplement Declaration will further fortify the foregoing statements by pointing out that the foregoing conclusions are based upon experimental results. Accordingly, it is respectfully requested that the Examiner reconsider his objection and give due weight to Mr. Young's statements as they will soon be supplemented.

Sections 3, 4 and 5 of the Office Action set forth numerous objections under 35 U.S.C. §112. Though Applicants representative disagrees with many if not all of the these objections, amendments have been made to the claims and specification to address the Examiner's concerns, to minimize the issues that may have to be taken upon appeal, if agreement with the Examiner can not be reached on allowable subject matter, to place this application in better form for appeal.

In the first instance, the Examiner has objected to Claims 1, 12 and 13 as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors had possession of the claimed invention. More specifically the Examiner objected to the phrase "... with adjacent chamfers at different angles to the axial direction of said fuel rods". In the application, as filed, the preferred angles of the chamfered portions of the flow through holes relative to the axial direction of the fuel rods was set forth in the specification and were provided in original Claims 5, 6, 16 and 17 "relative to a flow axis of the flow through hole" which is parallel to the axis of the fuel rods. However, to avoid this issue Applicant's have amended Claims 12 and 13 with the corresponding language reading "... with each adjacent chamfer at a different angle than another adjacent chamfer relative to the axial direction of the fuel rods." If the Examiner prefers Applicants are willing to amend this language further to read "...with each adjacent chamfer at a different angle than another adjacent chamfer relative to a flow axis of the flow through hole". However, this additional change is believed to be completely unnecessary in view of the language in the original claim that states "each of said coolant flow through holes when incorporated in said fuel assembly, extending substantially in the axial direction of said fuel rods."

On the same basis, the Examiner has objected to Claims 1 and 12 because of the limitation "... wherein the flaring at the lower face of said plate comprises a series of a plurality of discrete chamfers with adjacent chamfers at different angles to the axial direction of said fuel rods." While the stated configuration is fully and completely described in the specification and

drawings, to overcome this issue Applicants are willing to amend this phrase in an attempt to satisfy the Examiner's concerns. Two different approaches are taken in Claims 1 and 12. In Claim 1 the corresponding language now reads "wherein the flaring at the lower face of said plate comprises a series of a plurality of concentric countersinks of different included angles and depths into the coolant flow thorough hole". In Claim 12 the corresponding language has been changed to read "wherein the flaring at the lower face of said plate comprises a series of a plurality of straight, discrete, adjacent chamfers with each adjacent chamfer at a different angle than another adjacent chamfer relative to the axial direction of said fuel rods". Applicants consider either the approach of Claim 1 or that of Claim 12 to be the equivalent in describing the invention. Therefore, if the Examiner prefers one over the other Applicants are willing to conform the claims to the approach selected by the Examiner. If the Examiner has some other suggestion, Applicants would very much appreciate a telephone call to consider the matter.

In Section 3C the Examiner objected to the language "double inlet chamfer" in Claim 13. To clarify this issue and overcome the Examiner's objection the language has been modified in the enclosed amendment to read "double chamfered inlet". Support for this limitation can be found starting at Page 8, line 27 through Page 9, line 15 and in original Claims 5, 6, 16 and 17. The angles are specifically given, both in degrees and as a ratio of chamfer length divided by the bottom nozzle plate thickness. Accordingly, there is complete support for the objected to claim limitation.

It is hoped that the amendments discussed above with regard to the response to Section 3A will satisfy the Examiner's corresponding concerns set forth in Section 4A. Similarly, the objections raised in Sections 4B and C correspond to the objections noted with regard to Sections 3B and C and it is hoped that the amendments discussed above with regard to these latter sections will overcome the Examiners concerns with regard to the corresponding Section 4 subparagraphs as well.

In Section 5A of the Office Action the Examiner objected to several noted phrases as lacking antecedent basis. The Amendments to the claims should now cure these objections.

In Section 5B Claims 1 and 12 were objected to as being vague, indefinite and incomplete. The Examiner asserted in support of this objection that it was not clear:

what all is meant by and encompassed by the limitation "a series" because the figures only show one or two chamfers not a series. The term "a series" connotes a broader

meaning than the two adjacent chamfers disclosed within the specification. Additionally, a series of a plurality of discreet chamfers does not connote any particular chamfers *per se*, hence the metes and bounds of the claim are undefined.

It would very much be appreciated if the Examiner would clarify what he meant by the latter sentence in the above quotation. The term “plurality” is defined as the state of being plural which means more than one. The term “series” is defined “as a number of things or events of the same class coming one after another in spacial or temporal succession”. The combination of the terms provides that there is more than one chamfer that occur in tandem one after another. There does not appear to be any reason, that Applicants can discern, why the phrase should be considered either vague, indefinite or incomplete. However, Applicants are willing to delete the phrase “a series of” in Claims 1 and 12 in view of the other amendments made herein to those claims, which arguably make the foregoing phrase redundant, if that change, along with the other amendments noted herein, will overcome the Examiners objections under 35 U.S.C. § 112.

In Section 5C of the Office Action Claims 1 and 12 were objected to as being vague, indefinite and incomplete because of the term “a plurality”. As mentioned in the previous paragraph a plurality is more than one. Since Applicants show at least two chamfers, Applicants should be entitled to use the term “plurality” and should not be limited to the preferred embodiment which is an example of the invention and is not meant to be limiting as to the claims.

In Paragraph 5D of the Office Action the Examiner objected to the term “adjacent chamfers at difference angles to the axial direction of said fuel rods”. As stated previously the amendments to the claims should now overcome this objection.

In Section 5E of the Office Action Claim 13 was objected to as being vague, indefinite and incomplete in regard to the term “double inlet chamfer”. It is believe that the foregoing amendments should overcome this objection as well.

In Section 5F of the Office Action Claim 2 is objected to as being vague, indefinite and incomplete in view of the phrase “the discreet chamfers”. The amendment to Claim 2 replaces the objected to phrase. The issue should now be moot in view of the amendment, but the answer to the Examiner’s concern over the original language is that the series of the plurality of discreet

chamfers refers to all of the chamfers being discreet, since none were excepted. Accordingly, Applicants request that the objection asserted in 5F should be withdrawn.

The response to the objections raised in Section 3 should cure the objections raised in Subsections 5H and 5I. Additionally, the objections raised in Section 5J should now be overcome by the amendments to Claims 1, 12 and 13.

In Section 5K the Examiner objected to Claim 17 as being vague, indefinite and incomplete in what all is meant by and encompassed by the phrase “Chamfer C is at the outlet of the flow through holes” since the claim does not specify the relative dimensions of chamfer C. The Amendments to Claim 17 should overcome this objection since the objected to phrase has been deleted.

The rejections stated in Section 6 – 11 under 35 U.S.C. § 103(a) are in substance a restatement of the rejections raised in the previous Office Actions. Applicants have fully responded to each of the Examiners points in the Response dated August 30, 2005, which is incorporated herein by reference. The substance of the Examiners arguments, as understood, is that the Johansson references disclose an inlet with rounded corners that can be thought of as being made up of an infinite number of discreet segments or chamfers. However, even if one was to take that position the chamfers would not be straight and would create an even greater machining problem than Westinghouse encountered with the Shallenberger design in trying to obtain uniform hydraulic performance. Each of the Johansson references is directed to a boiling water reactor, which has a very different hydraulic environment than a pressurized water reactor for which Applicants claims are now limited to. None of the Johansson coolant inlets to the lower tie plate show a double or multiple chamfer design with the chamfers being discreet and straight. While Shallenberger is directed to a lower nozzle for pressurized water reactor it only shows a single inlet chamfer and no outlet chamfer. There is no mention in Shallenberger et al. to a double or multiple chamfered inlet or an outlet chamfer. While Tucker et al. describes one embodiment, with regard to FIG. 15 and the corresponding explanation in the paragraph spanning Columns 17 and 18, that has a double chamfered inlet, the Tucker embodiment is described in the context of an apparatus for measuring the flow rate and/or viscosity of a liquid in a laminar environment that does not take into account the flow characteristics of the liquid when it exits the device. In contrast the hydraulic environment in a pressurized water reactor is

extremely turbulent. The Tucker et al. reference is concerned with maintaining laminar flow in an elongated fluid passage within the device with two parallel opposed sides and a flared entry portion leading to a portion of constant cross section. Accordingly, the design of the Tucker et al. reference does not provide any teaching or suggestion of the benefits such an inlet would have in the context of an inlet of a flow through hole in a bottom nozzle of a pressurized water reactor fuel assembly. Accordingly, it is respectfully believe that Applicants, claims as now amended, patentable distinguished over the cited references, considered either singly or in combination.

As stated previously if the Examiner disagrees with Applicants position and has some suggestions on how the issues might be narrowed for appeal or to allow this application, a telephone call to Applicant's representative, at the number set forth below, would be gratefully appreciated.

Respectfully submitted,



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